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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,334	09/18/2003	Stephen R. Barnes	2003P11510US	5441

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Intellectual Property Department
170 Wood Avenue South
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EXAMINER	
CWERN, JONATHAN	
ART UNIT	PAPER NUMBER
3737	
MAIL DATE	DELIVERY MODE
03/27/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,334	BARNES, STEPHEN R.	
	Examiner	Art Unit	
	Jonathan G. Cwern	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-25 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-25 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 10-11 and 15-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Baumgartner et al. (US 6831394).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing material can be varied (column 6, line 55-column 7, line 64).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-8, 13-14, 17-25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing material can be varied (column 6, line 55-column 7, line 64). Baumgartner et al. fail to show using two different materials for the backing, and using an anechoic surface shape.

Proctor discloses a transducer for measuring transient tangential motion. Proctor teaches the use of a transducer backing, which contains two different materials. The backing has a shape that causes vibrations from the transducer to be reflected many times within the backing, preventing the vibrations from re-entering the transducer (anechoic surface). This structure is equivalent to the claimed "Rayleigh dump". This structure is described in applicant's specification in paragraph [0023], where it is also stated that any other now known or later developed anechoic surfaces may be used. The first backing material has acoustical properties similar to that of the transducer material and is a solid block of metal. The second backing material has high absorption and scattering of ultrasonic energy in the frequency range of operation of the transducer (column 4, line 53-column 5, line 15 and Figure 1).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used two materials and constructed the shape of the backing material so as to prevent vibrations from re-entering the transducer as taught by Proctor, in the device of Baumgartner et al. Baumgartner et al. attempt to test different variations of backing material to find a suitable combination of acoustic impedance and absorption, so as to improve the transfer of energy from the transducer to the backing, while also ensuring that the sound does not return to the transducer, using one backing material. However, this technique will result in a tradeoff in optimizing those two properties. The two material technique taught by Proctor will provide a suitable substitution and improvement, by using one material to improve the transfer of energy, and a second material to ensure the sound does not return to the

transducer. Designing the backing shape preventing vibrations from entering the transducer is an additional benefit.

In addition, while specific percentages have been claimed in regards to the acoustic impedances of the backing materials and the transducer materials, it would be obvious to one of ordinary skill in the art to slightly modify the materials to achieve those goals. So long as the first backing material is a close match to the transducer material, and the second backing material acts as a good absorber.

Also, as the backing material acts to "guide" the acoustic waves, the material can be considered a "wave guide".

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701) as applied to claim 8 above, and further in view of Sudol et al. (US 5629906).

Sudol et al. disclose an ultrasonic transducer. Sudol et al. teach that aluminum or tungsten can be used in the backing layer (column 4, lines 1-30).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used aluminum in the backing material as taught by Sudol et al., in the device of Baumgartner et al. One of ordinary skill in the art, when designing a transducer, can select whichever metal is most appropriate based on the desired properties of the backing layer. The use of a variety of different metals being used as a backing layer is old and well known in the art.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Sudol et al. (US 5629906).

Baumgartner et al. show a backing material for micromachined ultrasonic transducers. An array of cMUT transducer cells is fabricated on a silicon wafer (column 4, lines 45-48). A backing layer is attached to the array of cMUT cells (column 5, lines 15-34). The backing material may also possess a high thermal conductivity to assist in removal of heat from the device (column 5, lines 53-59 and column 7, line 65-column 8, line 17). The backing material is matched in acoustic impedance to the silicon, to prevent reflection of acoustic energy. The material may comprise a composite material containing tungsten. The acoustic impedance of the material was 19.4 Mrayls, with an acoustic attenuation of -4.9 dB/mm at 5MHz. Baumgartner et al. further state that one of ordinary skill in the art would recognize that the composition of the acoustic backing material can be varied (column 6, line 55-column 7, line 64). However, Baumgartner et al. fail to show the specific use of aluminum as the metal.

Sudol et al. disclose an ultrasonic transducer. Sudol et al. teach that aluminum or tungsten can be used in the backing layer (column 4, lines 1-30).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used aluminum in the backing material as taught by Sudol et al., in the device of Baumgartner et al. One of ordinary skill in the art, when designing a transducer, can select whichever metal is most appropriate based on the desired properties of the backing layer. The use of a variety of different metals being used as a backing layer is old and well known in the art.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al. (US 6831394) in view of Proctor, Jr. (US 4782701) as applied to claim 1 above, and further in view of Miller David G. et al. (US 5267221).

Miller et al. disclose backing for an acoustic transducer array. Miller et al. teach that the acoustic impedance of the backing material can be selected to cause the backing material to function as a waveguide (column 6, lines 49-68).

It would have been obvious to one of ordinary skill in the art, to have selected the acoustic impedances of the backing material to allow the backing to function as a waveguide as taught by Miller et al., in the device of Baumgartner et al. This will allow the backing to draw acoustic energy away from the transducer, further ensuring that energy will not be reflected back to the transducer.

Response to Arguments

Applicant's arguments filed 12/11/08 have been fully considered but they are not persuasive.

In regards to applicant's arguments that Baumgartner et al. do not show a backing block, examiner respectfully disagrees. The term "substantially" is used when describing the amount of attenuation. As is known in the art, the backing block should be sufficient to prevent acoustic energy from going back into the device. The backing layer of Baumgartner et al. accomplishes this goal (column 6, lines 55-58) and therefore has "substantially" no acoustic attenuation at a range of frequencies.

In regards to applicant's arguments regarding the combination with the Proctor reference, examiner respectfully disagrees. Proctor is relied on to teach using two different materials in a backing and using an anechoic surface shape. These teachings are not dependent on having a single transducer or an array of transducers. One of ordinary skill in the art could apply these teachings to any type of system seeking to prevent vibrations from entering into a device. And of course the differences between a single transducer and an array of transducers is well known in the art, and one of ordinary skill in the art is able to adapt many teachings applied to a single element, to an array of elements. In regards to applicant's arguments regarding the tangential motion, the same arguments apply, and one of ordinary skill in the art would apply the teachings of Proctor to any type of system seeking to prevent vibrations from entering into a device.

In regards to applicant's arguments regarding the Rayleigh dump, examiner respectfully disagrees. As pointed out in the rejection, the structure in Proctor is equivalent to the claimed "Rayleigh dump", as it is described in applicant's specification in paragraph [0023], where applicant also states that any other now known or later developed anechoic surfaces may be used.

In regards to applicant's arguments regarding claim 5, examiner respectfully disagrees. The claim recites "the anechoic surface being at an interface of the first material and the second material". As shown in the Figures of Proctor, an anechoic surface is clearly where the two materials meet.

In regards to applicant's arguments regarding the use of Aluminum, examiner respectfully disagrees. As shown by Sudol et al. and as is old and well known in the art, a variety of different materials can be used when designing transducers. Sudol et al. mention both Tungsten and Aluminum, and it is clear that one of ordinary skill in the art can choose whichever material they desire for their specific invention based on the specific advantages and disadvantages of the materials.

In regards to applicant's arguments regarding the waveguide, examiner respectfully disagrees. A waveguide is something which guides a wave. Reverse waveguides or anti-waveguides are in fact simply different types of waveguides. They all act to guide waves. The feature in Miller et al. guides acoustic energy, and is thus a waveguide.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is (571)270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jonathan G Cwern/
Examiner, Art Unit 3737

/BRIAN CASLER/
Supervisory Patent Examiner, Art Unit 3737